

Notice of Allowability

Application No.

10/721,615

Examiner

Ben Lewis

Applicant(s)

UEDA ET AL.

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12/26/06.
2. ☒ The allowed claim(s) is/are 1-3.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

REASONS FOR ALLOWANCE

Claims 1-3 are allowed. The invention of independent claim 1 recites:

A fuel cell system comprising:

a fuel cell for generating electricity using a hydrogen gas and an oxidant gas as a reaction gas;

a hydrogen discharge unit for discharging hydrogen from the fuel cell under a predetermined condition;

a hydrogen concentration reduction process unit for reducing the concentration of hydrogen discharged from the hydrogen discharge unit;

a hydrogen concentration detection unit for detecting an instantaneous hydrogen concentration of a gas processed by the hydrogen concentration reduction process unit;

and an average hydrogen concentration calculating unit for calculating an average hydrogen concentration per hour of a gas processed by the hydrogen concentration reduction process unit, wherein

the discharge of hydrogen from the fuel cell by the hydrogen discharge unit is prohibited in the event that an instantaneous hydrogen concentration detected by the hydrogen concentration detection unit exceeds a first threshold, or the average hydrogen concentration calculated by the average hydrogen concentration calculating unit exceeds a second threshold which is lower than the first threshold, and the

Art Unit: 1745

discharge of hydrogen from the fuel cell by the hydrogen discharge unit is permitted in the event that the instantaneous hydrogen concentration does not exceed the first threshold and the average hydrogen concentration does not exceed the second threshold.

The prior art does not teach or suggest a cell including all of the claimed features. The most pertinent art includes Yoshizumi et al. (U.S. Pub. No. 2002/0094469 A1), which disclose an onboard fuel cell system and method of discharging hydrogen-off gas wherein the fuel cell is supplied with hydrogen gas and oxidative gas, generates electric power using the hydrogen gas and the oxidative gas, and discharges hydrogen-off gas and oxygen-off gas that have been consumed (Paragraph 0011). The hydrogen gas that has thus been supplied is consumed for the electrochemical reactions in the fuel cell **100**, turns into hydrogen-off gas, and is discharged to the circulation flow passage **403** (Paragraph 0052). Then, hydrogen gas that has been discharged from the shut valve **414** flows through the exhaust flow passage **407**, is delivered to the oxygen-off gas exhaust flow passage **503**, and is mixed with oxygen-off gas flowing through the oxygen-off gas exhaust flow passage **503** in the mixing portion **411**. Because hydrogen gas discharged from the shut valve **414** is hydrogen-off gas, the concentration of hydrogen is relatively low. Also, oxygen-off gas discharged from the fuel cell **100** is also nitrogen-rich gas that has been removed of oxygen in the fuel cell **100**. Accordingly, if hydrogen-off gas is thus mixed with oxygen-off gas and diluted, the

Art Unit: 1745

concentration of hydrogen contained in the mixed gases is further reduced (Paragraph 0058). However, it is possible to dispose a hydrogen concentration sensor or the like in the hydrogen gas flow passage, detect the concentration of hydrogen in circulating hydrogen gas, and open the shut valve **414** if the concentration drops below a reference concentration (Paragraph 0057).

With regard to the hydrogen concentration calculating unit Yoshizumi et al teach that the shut valve **414** is disposed in the exhaust flow passage **407** that branches off from the circulation flow passage **403**. If the concentration of impurities in circulating hydrogen gas is increased, the control portion **50** opens the shut valve **414** so as to discharge part of the circulating hydrogen gas that contains impurities. Thereby, part of the hydrogen gas containing the impurities is discharged from the circulation passage, and pure hydrogen gas is introduced correspondingly from the hydrogen-occluding alloy tank 200 (Paragraph 0055).

The Yoshizume et al. reference does not teach or suggest having a an average hydrogen concentration calculating unit for calculating an average hydrogen concentration per hour of a gas processed by the hydrogen concentration reduction process unit, wherein the discharge of hydrogen from the fuel cell by the hydrogen discharge unit is prohibited in the event that an instantaneous hydrogen concentration detected by the hydrogen concentration detection unit exceeds a first threshold, or the average hydrogen concentration calculated by the average hydrogen concentration calculating unit exceeds a second threshold which is lower than the first threshold, and the discharge of hydrogen from the fuel cell by the hydrogen discharge unit is permitted

Art Unit: 1745

in the event that the instantaneous hydrogen concentration does not exceed the first threshold and the average hydrogen concentration does not exceed the second threshold.

For these reasons, the claims are allowed over the prior art. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1745

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745


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SUPERVISOR